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Abstract. To date, analyses of long-term trends in the spatial distribution of poverty in Britain have been frustrated by a lack of consistency in definitions, data sources and measures, as well as by changes over time in census and administrative geographies. This paper draws upon a series of national poverty surveys in order to derive methodologically consistent estimates of breadline and core poverty. These models are then applied to census data in order to describe the changing geography of poverty in Britain over the 1968 – 99 period. The primary concern is to reveal the changing spatial distribution of poverty that lies behind the headline figures. These analyses suggest that not only has poverty become increasingly prevalent amongst British households, it also became increasingly spatially concentrated between 1968 and 1999.

Introduction

In recent decades, census data have been the basis for much research into the spatial distribution of disadvantage in Britain as a result of their national population coverage and potential for spatial disaggregation. Although the census is not designed with the explicit intention of measuring poverty, a range of census indicators of wider disadvantage have been used to make inferences about the geography of poverty in contemporary Britain, including worklessness, car ownership, housing tenure, overcrowding, household amenities, occupational class, educational attainment, and ill health (see Champion et al, 1987; Dorling and Thomas, 2004; Gordon and Forrest, 1995; Green, 1994; Philo, 1995). Recent advances in computing and GIS methods have facilitated improved opportunities for data visualisation and analysis using census data, for example, through the use of population cartograms (Thomas and Dorling, 2007), and by applying historical GIS methods to examine long-term patterns of disadvantage (Gregory et al, 2000). These studies convey a very consistent message: the incidence of disadvantage in Britain is consistently highest in geographically peripheral regions, and especially in urban, metropolitan, and (post)industrial areas. However, although spatial inequalities are enduring, inequalities between places have widened further in the period since 1981. In this paper our principal concern is to understand how the geography of poverty has changed. We have combined four decades of census data with poverty survey data to estimate levels of poverty in a consistent way over time.

None of the questions included in recent censuses was intended to measure poverty directly, and the indicators used in existing studies should at best, therefore, be considered proxy measures. In the absence of income data, which have been consistently excluded from the UK census questionnaire, and will be excluded again in 2011, analysis of census data has focused upon the measurement of living conditions. Since deprivation is multifaceted, analyses of singular indicators of 'disadvantage' have rarely been sufficient and an alternative and influential approach has therefore focused upon developing various indices of deprivation using multiple indicators derived from administrative and/or census sources (eg Breadline, Carstairs, DETR Index of Multiple Deprivation, DoE Index of Local Conditions, Jarman, Townsend).

Although deprivation indices have been highly influential in shaping our understanding of the geography of poverty, their construction and validation have been subject to intense discussion as a result of considerable differences in the ranking of areas at a local level (eg Carstairs and Morris, 1991; Deas et al, 2003; Lee at al, 1995). Such disparities arise as a result both of differences in the conceptualisation of poverty and deprivation and in their empirical measurement.

Although definitional clarity is essential for accurate measurement, existing indices do not always proceed on the basis of an explicit theoretical model of poverty (eg Carstairs and Morris, 1989; DETR, 1998; Jarman, 1983; ODPM, 2003). Very rarely is the same theoretical model used for more than one point in time. We therefore begin by outlining a theoretical framework for understanding poverty from the perspective of relative deprivation that is applicable over many decades. Similarly, methodologies for deriving census weightings do not always reflect an accurate picture of the social profile of poverty vulnerability within the population it is intended to measure. This is certainly true when a methodology design for just one point in time is applied ten or twenty years later. To solve this problem we build on the approach developed by Gordon (1995), going on to propose a method for deriving longitudinally consistent small-area poverty estimates for the 1971 – 2001 period. We then present long-term trends in the spatial distribution of poverty for 1971, 1981, 1991, and 2001, on the basis of population-weighted cartograms and measures of spatial polarisation. We conclude by commenting on the changes these new methods have uncovered.

The theory and measurement of poverty

The 'rediscovery' of poverty from the 1960s onwards, associated with the work of Townsend (1974; 1979) and others, reflects the now widely accepted 'relative deprivation' understanding of poverty as exclusion from contemporary living patterns, customs, and activities arising from insufficient resources. Within this perspective, households are said to be poor when they have both a low income and a low standard of living relative to contemporary understandings of the 'necessities of life' (Gordon, 2007). Whilst this approach has been hugely influential worldwide in Britain, surprisingly there have been only four nationally representative scientific surveys of poverty in the past fifty years which have focused explicitly on direct measurement of living standards (ie material and social deprivation). These were conducted in 1968/69 (Townsend, 1979), 1983 (Mack and Lansley, 1985), 1990 (Gordon and Pantazis, 1997), and 1999 (Gordon et al, 2000).

All four surveys were undertaken by academic researchers and were on a relatively small scale, involving samples of between 1500 and 2000 households. Despite the restricted sample sizes, the aforementioned surveys reflect a comparable relative deprivation approach to the definition and measurement of poverty, that is, relative to contemporary understandings of the 'necessities of life'. Through secondary analysis of these datasets it is therefore possible (for the first time) to derive theoretically

consistent national estimates of poverty at the household level over the period 1968 – 99 based on low income combined with material and social deprivation.

Using a 'synthetic modelling' approach, it is also possible to examine the changing spatial distribution of poverty at a small-area level over this period by applying the resultant sample survey models to national census data for 1971 to 2001. Deriving census weights which reflect the real-world pattern of vulnerability to poverty at a household level is essential to accurate estimation at a small-area level. This can be done using the national poverty survey data, by estimating the multivariate odds of poverty and applying the resultant regression weights to British census data for 1971 (combined with the 1968/69 national poverty survey), 1981 (1983 survey), 1991 (1990 survey), and 2001 (1999 survey). This paper describes the methodology used to derive both theoretically consistent models of poverty as applied to 1971 – 2001 census data, and presents an overview of the findings relating to the extent and spatial distribution of poverty in Britain over this period. It establishes a method that can be scientifically repeated when the 2011 Census results are released during the year 2013.

Aims and methods

Here, we estimate two different models of poverty: breadline poverty and core poverty. The breadline index reflects a consensual approach to relative poverty measurement which, as discussed above, is now well established in mainstream poverty research. This approach defines deprivation with reference to contemporary public perceptions of those items and activities constituting the material and social 'necessities of life' within a given society (see eg Gordon and Pantazis, 1997; Gordon et al, 2000; Mack and Lansley, 1985; Pantazis et al, 2006). By applying the breadline methodology on a consistent basis to the above surveys, households can be identified as experiencing breadline poverty where they have both a low income and lack, because they cannot afford them, many of those items considered at each point in time (ie in 1968/69, 1983, 1990, and 1999) by a majority of the British public to constitute contemporary necessities of life.

The breadline approach therefore allows for change over time in the public's perceptions of the necessities of life which occur as a result of rising overall living standards and cultural and technological change. This approach involves the construction of reliable, valid, and additive deprivation indices for each of the four surveys, and the estimation of contemporary poverty thresholds which maximise the statistical fit between material and social deprivation and low income (Gordon, 2007). Using a logistic regression approach the sociodemographic predictors of poverty are then estimated and the resultant regression coefficients are applied to census small-area statistics.

Census-output geography has changed for each census since 1971, making longitudinal comparisons for consistent boundaries difficult or impossible. Here, we therefore apply census-tract geography which has been specifically designed to facilitate longitudinal analysis, with areal units ranging in size between around 5000 and 38 000 households in 2001 (mean 18 600) (see Dorling, 1994; Dorling and Pritchard, 2010).

In contrast, the 'core poverty' model is derived theoretically drawing upon Bradshaw's (1972a; 1972b; 1994) 'taxonomy of need'. Within this perspective, people are said to experience a combination of 'normative', 'felt', and 'comparative' poverty—for example, where people are simultaneously income poor, deprivation poor, and subjectively poor (see Bradshaw and Finch, 2003). The concept of 'core poverty' is therefore applied here to describe households which are simultaneously income poor, deprivation poor and subjectively poor. Income-poor households are those with a net weekly household income less than 70% of the contemporary equivalised household median—this is the income threshold used by the UK government to officially measure

child poverty when combing low income and material deprivation. This income threshold is laid down in statute in paragraph 4(2) of the Child Poverty Act 2010.[1]

Following Whelan et al's (2001) analysis, households are identified as 'deprivation poor' where they lack any items comprising the Basic Deprivation Index.[2] Households are therefore defined as experiencing 'core poverty' if they have a low income *and* they are basic deprivation poor *and* they also consider their household to be genuinely poor 'sometimes' or 'all the time' (ie they are subjectively poor). Since the selected deprivation items are the same for each time period, they define an 'absolute' deprivation threshold. As such, we might expect a decline over time in the number of households experiencing core poverty assuming a general (and equitably distributed) increase in living standards.

In order to facilitate longitudinally consistent measurement of both breadline and core poverty, survey definitions and measures need to be harmonised across time (ie between national poverty surveys), and between data sources (ie between sample surveys and decennial census returns). This is in itself a nontrivial exercise, but also means that the changing geography of poverty described here is constrained by the suitability of census indicators as predictors of poverty vulnerability. Alongside harmonisation of indicators, the survey data themselves must also be reweighted to reflect the population distribution within the relevant census decennial data to which the model weights will subsequently be applied. This can be achieved through poststratification weighting for key demographic variables (in this case: age group, tenure, sex). This is done in order to ensure that survey data are representative of the social distribution of the British population for the relevant census period.

An ideal deprivation index should be preference free, valid, reliable, and genuinely additive (Gordon, 1995), as described below. The construction of such indices is a complex process. The remainder of this section describes the construction of the 'breadline deprivation index' as applied to the national poverty surveys, before going on to describe the construction of breadline deprivation indices in general, the estimation of breadline poverty thresholds, and the application of the resulting models of both breadline and core poverty to national census data.

Defining breadline deprivation indices

Firstly, items to be included in a breadline definition should be defensible on the grounds that the components are items that most people would be unlikely to want to do without (preference free). Within the 'consensual' approach to poverty measurement only items that a majority of the population view as necessities of life are considered as potential deprivation indicators, and households are considered 'deprived' only where they lack items because they cannot afford them rather than through choice. The 1968/69 Townsend survey does not contain data on whether households lack items through choice or because they cannot afford them and, in the absence of such data, only items lacked by a minority of households in 1968/69 were included. Whilst there is some evidence of age variations in public perceptions of necessities within the 1999 survey, which may reflect changing cultural differences and tastes, the general pattern is of a high degree of consistency between social groups

[1] http://www.opsi.gov.uk/acts/acts2010/ukpga_20100009_en_2#pt1-pb1-l1g4

[2] These are: in arrears on rent/mortgage, utilities, or hire purchase; buys second-hand, not new, clothes; cannot afford meat, chicken, or fish every second day; cannot afford to keep home adequately warm; cannot afford to replace worn out furniture; cannot afford one week's annual holiday away from home; cannot afford to have friends/family for a meal once a month. Whelan et al (2001) use 'inability to afford to replace worn out furniture'. This variable is not available in the 1968/69 and 1983 poverty surveys, and is replaced with 'Cannot afford chairs for household residents' and 'Cannot afford carpets in living areas', respectively.

in perceptions of what constitute the necessities of life: for example, with regard to gender, social class, and poverty status (Pantazis et al, 2006).

Secondly, the construct validity of the items can be established by determining the extent to which experimental measures correlate with some criterion measure whose validity is known and accepted. This can be done by calculating the relative odds ratios for the index components against established correlates of deprivation whilst controlling for other known covariates. Here, the following established covariates of deprivation were used to validate the indicators, using logistic regression and ANOVA: limiting illness/general health; subjective poverty/income adequacy; and household equivalised income.

Thirdly, the internal consistency (reliability) of the index and its components can be established statistically using classical measurement theory. Here, reliability analysis is conducted iteratively to select the most reliable subset of indicators for each national poverty survey dataset. Finally, it is important that index components are additive: for example, we should expect that households who lack both central heating and a car are poorer than those who lack only one of these items. To establish additivity, we estimate ANOVA (analysis of variance) main effects and produce interaction plots for deprivation items against equivalised household income. For each pair of items, respondents who lack both items should have significantly lower incomes than those who lack only one item or none.

Tables A1 and A2 (appendix) describe the final harmonised deprivation indicators for the four surveys. Table A1 shows public perceptions of the necessities of life and the proportion of households lacking these items in 1968/69, 1983, 1990, and 1999. Rising overall standards of living are reflected in a declining prevalence for virtually all selected deprivation indicators over the 1968–99 period. However, as items become more widely available, public perceptions of what constitute the 'necessities of life' change to encompass a far wider range of goods, services, and activities. As predicted by the relative theory of poverty, public perceptions of the 'necessities of life' closely reflect the activities and styles of living widely available to the British population at the time.

Table A2 shows the items deleted from the deprivation indices for 1968/69, 1983, 1990, and 1999 with regard to criteria proposed by Gordon (1995), namely: public acceptability, construct validity, scale reliability and additivity. Many items (eg car, dressing-gown, fortnightly night out) consistently lack public acceptability (ie are not considered necessities of life by a representative majority of the general public), and were therefore excluded although, as noted above, the increasing public acceptability of some items (eg telephone, heating, best outfit) reflects their growing availability. Many other items (eg indoor toilet, bath/shower, television, beds for everyone) are now so widely available that their absence is no longer clearly associated with poverty (ie they lack validity), and where they remain valid indicators their inclusion in any case adds little to the precision of deprivation indices (ie they lack reliability). A number of further items (eg three pints of milk per person per week; cooked meals every day; medicines from GP) were excluded because their combination with other deprivation items is not associated with significantly lower mean household equivalised incomes (ie they lack additivity). Table A3 summarises the indicators selected for inclusion within the models of breadline and core poverty for 1968/69, 1983, 1990, and 1999.

Estimating breadline poverty thresholds

Within the breadline approach, households are considered poor where they are both income poor and lack the necessities of life according to the prevailing standards of the time. Determining optimal deprivation thresholds for the national poverty surveys is therefore of critical importance. Crucially, this involves establishing the level of

income below which the incidence of deprivation begins to increase disproportionately (Townsend, 1979). The relationship between household income and deprivation can therefore be modelled formally, using ANOVA and logistic regression techniques which maximise the covariation between variables on the basis of the goodness-of-fit statistics (*F*-ratio and model χ^2 respectively) (see Gordon, 2007). Households are defined as poor where they report both high (above threshold) levels of deprivation *and* have household incomes less than the mean of nondeprived respondent households.[3] In line with best practice in income measurement (Rio Group, 2006), estimates are based upon equivalised household incomes, which adjust income by need based upon household size and composition in order to allow for economies of scale.

Here we model the statistical fit between Poverty and Social Exclusion Survey (PSE) equivalised household income and various binary deprivation index thresholds (ie 1+ item, 2+ items, etc) controlling for household composition using ANOVA and logistic regression techniques.[4] Table A4 presents goodness-of-fit statistics based upon one-way ANOVA (*F*-ratio) and logistic regression (model χ^2) for different deprivation thresholds in order to identify optimal thresholds for the 1968/69, 1983, 1990, and 1999 indices. For example, the optimal deprivation thresholds with regard to the 1990 and 1999 surveys are 3+ items and 2+ items, respectively.

Deriving weightings for census deprivation indices

Based upon the above approach, we estimate the multivariate odds of poverty using harmonised variables common to the poverty surveys and the relevant census, and subsequently apply the model(s) to British census data at a variety of spatial scales. Our dependent variables are:

- core poor: household income less than 70% of equivalised median *and* deprivation poor (Basic Deprivation Index) *and* subjectively poor 'sometimes' or 'all the time'
- breadline poor: deprivation poor (Breadline Index) *and* low PSE-equivalised household income

With the aid of a logistic regression approach (described further below), the estimated number of poor households in any census areal unit based upon these models can be expressed as an additive function of the model coefficients (see Gordon, 1995). As applied to GB census headcounts for the relevant variables (N), the number of poor households (N_{poor}) is a function of the sum of the model regression coefficients ($\beta_{X_{L..i}}$). Since the models do not provide a perfect fit with the observed data, they will not correctly classify all cases. The model estimates will usually undercount the actual incidence of poverty, and the regression coefficients must therefore be adjusted by applying a suitable correction factor (w) so that the predicted census estimates match the actual estimates based upon the survey frequencies. The number of poor households in any given area is therefore:

$$N_{\text{poor}} = \sum \left(\frac{\beta_{X_{L..i}}}{10} wN \right).$$

Results

The extent of breadline and core poverty

Whilst our main focus here is on the changing spatial distribution of poverty at a small-area level, it is important first to examine the characteristics of the synthetic

[3] The contemporary weekly equivalised household income thresholds for the nondeprived group were £104 (1968/69), £170 (1983), £205 (1990), and £365 (1999).

[4] Whilst most researchers agree that income adequacy should take account of variation in household size and composition, there is little consensus upon the most appropriate weighting scheme. Here, we adopt the income-equivalisation methodology adopted within the 1999 PSE; for further details see Gordon et al (2000) and Gordon (2006).

models of breadline and core poverty upon which these data are based. Table 1 shows trends over the 1971 – 2001 period in estimates of breadline and core poverty and disaggregates these data by household type, tenure, occupational class, and economic status. Table 1 shows that during the 1970s, levels of breadline and core poverty both dropped at fairly similar rates, declining by around a third over the decade. During the 1980s, breadline and core poverty increased substantially, effectively reversing the improvements seen in the previous decade. During the 1990s, breadline poverty rates continued to rise, reaching an unprecedented 28% of households, whilst the proportion of households experiencing core poverty actually dropped to levels similar to those of 1981.

In understanding these overall trends it is instructive to examine the changing pattern of social vulnerability to poverty—for example, with regard to household type, tenure, occupational class, and economic status—as illustrated in table 1. During the 1970s the proportion of single pensioners living in poverty declined dramatically and, despite a general decline in levels of poverty, breadline and especially core poverty became more concentrated amongst semiskilled/unskilled occupational groups.

Table 1. Breadline and core poverty (%) by household type, tenure, occupational class, and employment status, 1968 – 1999.

	Breadline poverty				Core poverty			
	1968/69	1983	1990	1999	1968	1983	1990	1999
Household type								
Single pensioner	58	11	29	32	38	10	17	10
Single working age	36	21	24	33	13	10	12	15
Single parent	32	35	62	70	25	42	55	46
Couple, no dependent children	23	6	11	16	14	4	7	7
Couple with dependent children	15	18	21	26	17	14	12	10
Other	21	16	21	26	16	10	18	7
Cramer's *V*	*0.29*	*0.18*	*0.26*	*0.28*	*0.19*	*0.21*	*0.28*	*0.30*
Tenure								
Owner-occupier	14	7	9	17	12	6	5	4
LA/HA rental[a]	41	22	48	63	22	17	34	35
Private rental	37	20	28	39	29	5	20	17
Cramer's *V*	*0.28*	*0.21*	*0.43*	*0.40*	*0.19*	*0.17*	*0.36*	*0.38*
Occupational class of HRP[b]								
Nonmanual	16	7	7	19	11	16	4	4
Skilled manual	31	13	14	28	23	33	5	13
Semiskilled/unskilled	43	43	40	39	32	51	30	18
Cramer's *V*	*0.25*	*0.33*	*0.37*	*0.19*	*0.21*	*0.39*	*0.36*	*0.18*
Employment status of HRP[b]								
In work	18	7	13	19	12	3	6	5
Unemployed	—	43	57	—	38	39	49	—
Inactive	45	13	26	18	32	9	18	37
Cramer's *V*	*0.27*	*0.33*	*0.33*	*0.25*	*0.23*	*0.39*	*0.38*	*0.32*
All	24.9	13.8	21.4	28.2	17.7	9.9	14.1	11.6

Note. All Cramer's *V* statistics are significant at the 0.001 level. — Insufficient data to provide reliable estimates. Survey data are reweighted to census data for: 1971 (1968/69); 1981 (1983); 1991 (1990); 2001 (1999).

[a] LA/HA—local authority/housing association.

[b] HRP—household reference person.

Table 2. The multivariate odds of breadline poverty—regression coefficients and derived census weights, 1968 – 99.

	$\exp\beta$	Weight
1971 (n = 1 759)		
Shares use of bath/shower	4.0	0.172
No access to a car	7.4	0.246
Council tenant	1.9	0.079
Private rental tenant	3.1	0.139
Manual SEG[a] (HRP)[b]	1.7	0.062
Overcrowded household	2.1	0.093
Single-pensioner household	3.1	0.139
Pensioner-couple household	1.6	0.057
Nagelkerke R^2		0.411
% correctly classified		80.8
1981 (n = 1 168)		
Shares use of bath/shower	8.9	0.279
Shares accommodation	6.3	0.235
No access to a car	2.6	0.121
Council/housing association tenant	3.0	0.141
Private rental tenant	2.2	0.098
Unemployed household (HRP)	3.2	0.147
3+ dependent children in household	2.7	0.127
Nagelkerke R^2		0.256
% correctly classified		87.4
1991 (n = 1 389)		
Single-parent household	3.8	0.222
Semiskilled/unskilled manual (HRP)	2.7	0.167
Not owner occupier	3.1	0.187
No access to a car	4.6	0.255
3+ dependent children in household	2.2	0.134
Unemployed household (HRP)	2.7	0.162
Single-pensioner household	1.7	0.090
Nagelkerke R^2		0.396
% correctly classified		85.2
2001 (n = 1 532)		
Unemployed household (HRP)	2.8	0.211
Single-parent household	3.7	0.271
Limiting long-term illness	2.2	0.161
No access to a car	2.2	0.164
Council/housing association tenant	4.0	0.286
Private rental tenant	1.9	0.130
Overcrowded household	8.1	0.435
Semi-routine NS-Sec[c] (HRP)	1.4	0.072
No central heating/shared amenities	1.7	0.109
Nagelkerke R^2		0.304
% correctly classified		78.1

Note. Estimates are logistic regression odds ratios—$\exp\beta$—based upon backward stepwise estimation (likelihood ratio method). All model coefficients are significant at the 0.001 level.
[a] SEG—socioeconomic group.
[b] HRP—household reference person.
[c] NS-Sec—National Statistics Socio-economic Classification.

Table 3. The multivariate odds of core poverty—regression coefficients and derived census weights, 1968 – 99.

	$\exp\beta$	Weight
1971 (n = 1 759)		
Shares use of bath/shower	1.5	0.070
No access to a car	2.4	0.143
Private rental tenant	2.0	0.111
Manual SEG[a] (HRP)[b]	1.9	0.107
Single-pensioner household	2.6	0.151
Pensioner-couple household	1.5	0.068
Nagelkerke R^2		0.173
% correctly classified		82.9
1981 (n = 1 168)		
Shares use of bath/shower	1.3	0.127
No access to a car	0.8	0.077
Council/housing association tenant	0.9	0.093
Unemployed household (HRP)	1.6	0.160
Single-parent household	1.7	0.164
3+ dependent children in household	1.2	0.117
Nagelkerke R^2		0.229
% correctly classified		91.3
1991 (n = 1 389)		
Single-parent household	5.0	0.197
Semiskilled/unskilled manual (HRP)	3.8	0.163
Not owner occupier	2.1	0.088
No access to a car	3.9	0.166
3+ dependent children in household	2.2	0.095
Unemployed household (HRP)	3.7	0.160
Single-pensioner household	1.7	0.061
Nagelkerke R^2		0.389
% correctly classified		90.4
2001 (n = 1 532)		
Unemployed household HRP)	3.5	0.074
Single-parent household	5.6	0.101
Limiting long-term illness	3.1	0.067
No access to a car	1.6	0.027
Council/housing association tenant	5.3	0.098
Private rental tenant	3.3	0.071
Overcrowded household	1.9	0.038
Semi-routine NS-Sec[c] (HRP)	16.3	0.165
No central heating/shared amenities	2.0	0.042
Nagelkerke R^2		0.362
% correctly classified		90.3

Note. Estimates are logistic regression odds ratios—$\exp\beta$—based upon backward stepwise estimation (likelihood ratio method). All model coefficients are significant at the 0.001 level.
[a] SEG—socioeconomic group.
[b] HRP—household reference person.
[c] NS-Sec—National Statistics Socio-economic Classification.

The 1980s and 1990s witnessed rising rates of poverty but this trend was especially dramatic amongst single parents (with nearly 70% classified as breadline poor by 2001), and to a lesser extent amongst couples with children. In the 1980s and 1990s, residential tenure became increasingly important, with the 1980s witnessing a significant

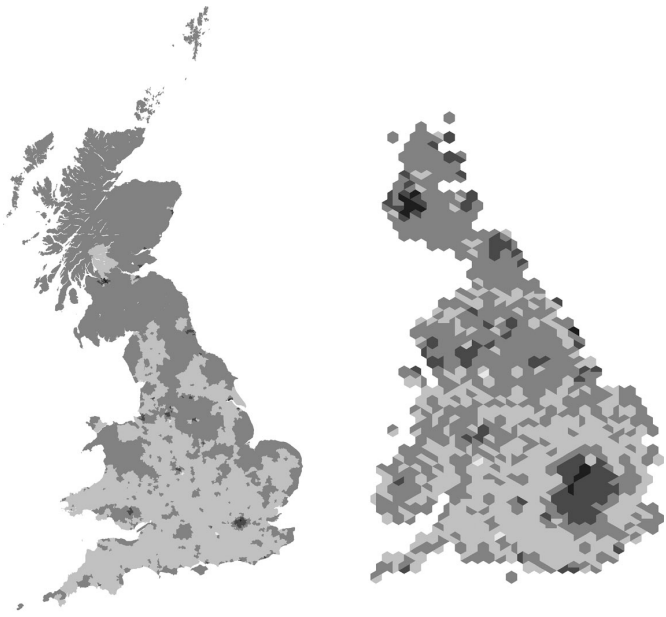
concentration of poverty amongst council tenants [perhaps as a result of council house sales (see Forrest et al, 1996)]. In the 1990s, breadline poverty rates amongst both social and private rental tenants increased dramatically, which is now believed to be partly as a result of declining housing affordability in the private housing market, the reduced availability of social rental provision and the 'residualisation' of council housing provision. In general, analysis of the nonparametric associations (Cramer's V) presented in table 1 suggests that socioeconomic factors (eg occupational class, employment status) were of greater significance in the 1970s and 1980s, and that housing tenure assumed increasing importance in the 1980s and beyond.

Based upon logistic regression, tables 2 and 3 present multivariate estimates of the odds of experiencing breadline and core poverty for a series of harmonised variables used to predict the incidence of poverty. For each census period, the models identify the best-fitting subset of predictor variables based upon backward stepwise selection. Table 2 shows the multivariate odds ($\exp\beta$) of breadline poverty for each variable included in the final model (ie taking into account the intercorrelations between predictors themselves). For example, in 1971 private rental tenants are predicted to be more than three times as likely (1 : 3.1) to experience breadline poverty in comparison with nonprivate rental tenants. Similarly, in 1971 private rental tenants are predicted to be twice as likely (1 : 2.0) to experience core poverty in comparison with nonprivate rental tenants. As expected, the best predictors of poverty change over time, as a reflection of the changing pattern of poverty vulnerability illustrated in table 1 (eg with regard to indicators such as single pensioner, pensioner couple, and single parent).

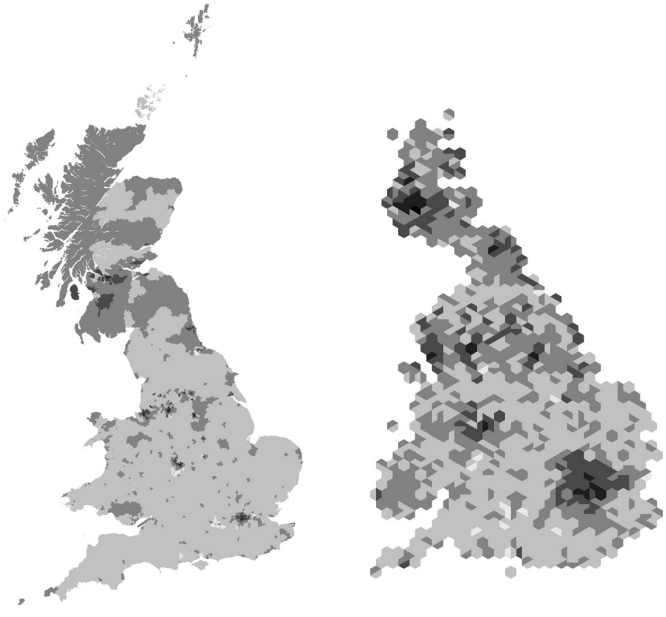
The regression models correctly classify between 78.1% and 91.3% of cases, with observed 'hit rates' (correct classifications) well in excess of the proportional by chance (PC) criterion and in most cases also in excess of the proportional reduction in error criterion (see Hosmer and Lemeshow, 2000). Nevertheless, even using the best subset of census indicators available, error rates of between approximately 1 in 5 and 1 in 10 remain as a result of the limitations of existing census indicators in predicting poverty, with substantial variations evident across datasets, over time, and between measures (sadly, no better questions are being added to the 2011 Census form which will, instead, ask many new questions about nationality and immigration status). In general, however, whilst the core poverty models perform better in accurately classifying respondents in comparison with breadline poverty models, this largely reflects the more unequal distribution of the former variable. Based upon the PC criterion, the breadline poverty models outperform the core poverty models for each period, and the overall model 'fit' as indicated by quasi-R^2 values is better for the breadline measure for every period with the exception of 2001.

The geography of breadline and core poverty

Methodological rigour is necessary, but our main concern in this paper is with the changing spatial distribution of poverty. Here we find that social polarisation declined during the 1970s, prior to a period of further significant growth in the spatial concentration of poverty at the small-area level in Britain in the 1980s. During the 1990s breadline poverty continued to become both more spatially concentrated and more widespread whereas the reverse is true with respect to core poverty. This is illustrated in figures 1 and 2 which describe the changing geography of poverty in Britain resulting from the use of a universal data mapping approach in which each tract is proportional in area to its population, whilst seeking to keep adjacent units together (see Thomas et al, 2009). Whilst this distorts the traditional cartographic projection of Britain, it gives a much clearer picture of urban poverty. Since tracts are roughly proportionate in size to their populations, the cartogram is also a more 'democratic' view of population geography, effectively according each person the same space on the map.

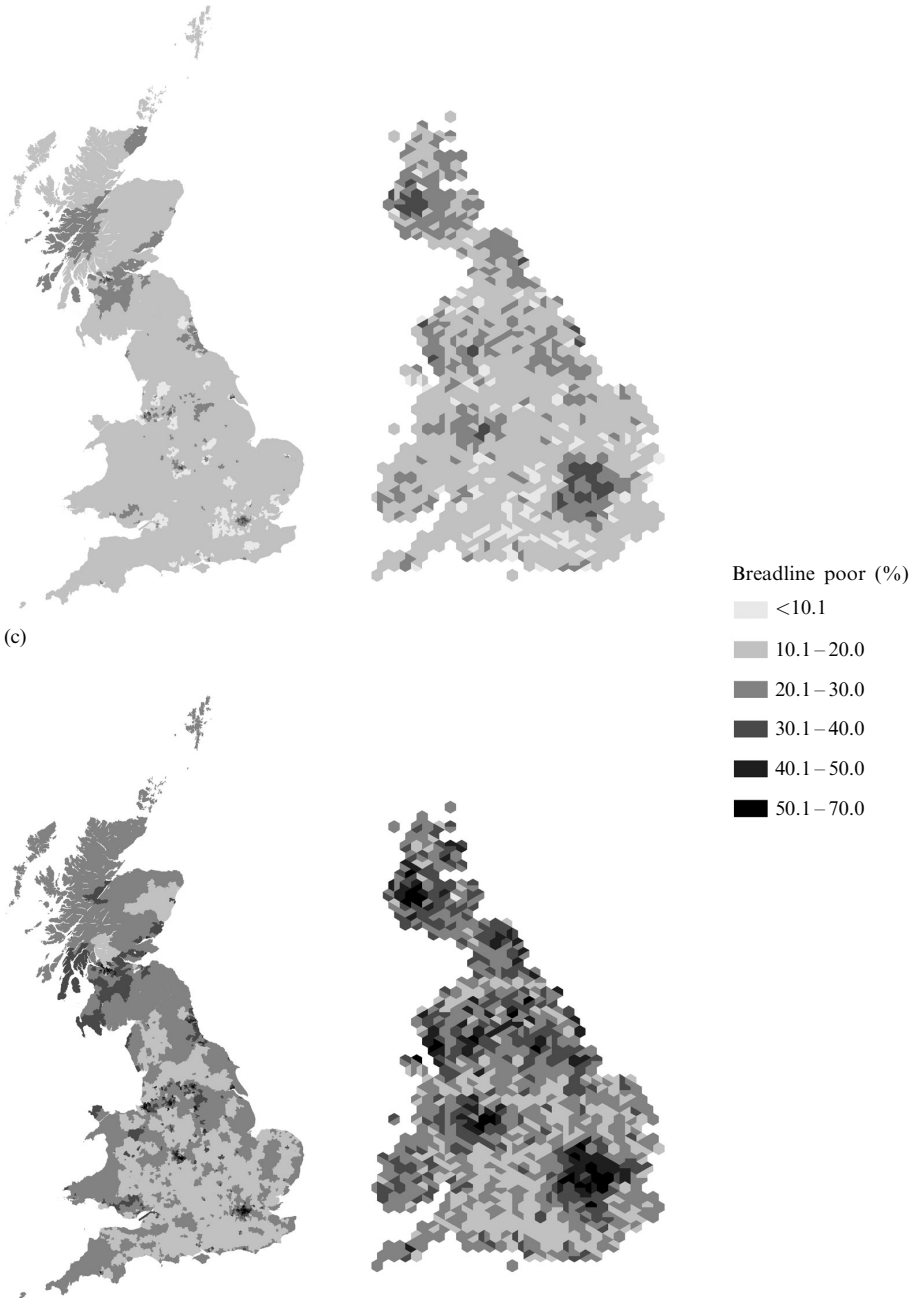


(a)



(b)

Figure 1. The changing geography of breadline poverty, (a) 1970, (b) 1980, (c) 1990, (d) 2000. Maps illustrate the percentage of households classified as 'breadline poor' at the relevant time period. Based upon synthetic estimates derived from national poverty surveys conducted in 1968/69, 1983, 1990, and 1999. Survey data reweighted to census distribution for 1971, 1981, 1991, and 2001, respectively.



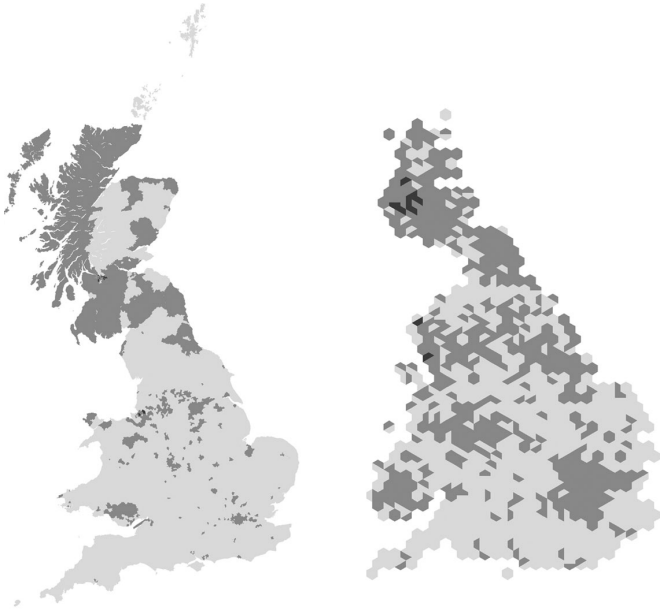
(c)

(d)

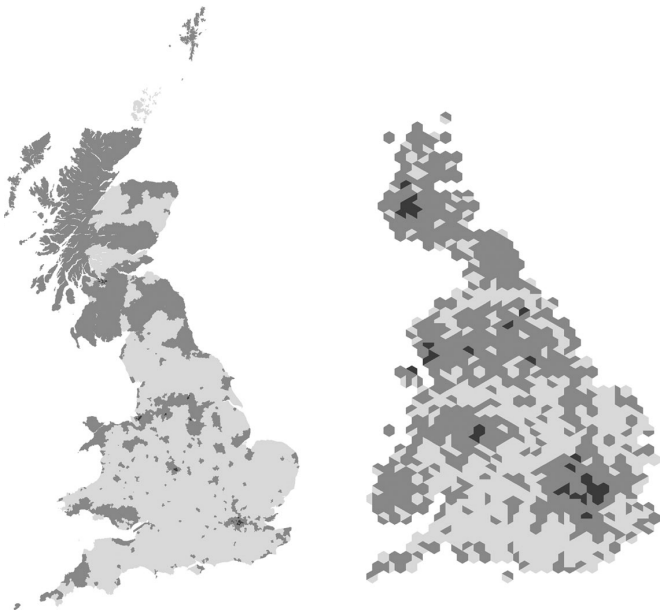
Figure 1 (continued).

Figures 1 and 2 show the changing spatial distribution of breadline and core poverty over the 1971 – 2001 period by applying the models derived from the (re-weighted) national poverty survey data for 1968/69, 1983, 1990, and 1999 to the relevant decennial census tract data. Figure 1 shows that breadline poverty rates generally vary between about 10% and 30%, with higher rates tending to be found in the north of England, Wales and Scotland. Rates of over 30% are only found in inner London, in the cities of

Figure 2. The changing geography of 'core poverty', (a) 1970, (b) 1980, (c) 1990, (d) 2000. Maps illustrate the percentage of households classified as 'core poor' at the relevant time period. Based upon synthetic estimates derived from national poverty surveys conducted in 1968/69, 1983, 1990 and 1999. Survey data reweighted to census distribution for 1971, 1981, 1991, and 2001, respectively.



(c)



(d)

Figure 2 (continued).

the North and West Midlands, in Scotland (especially Glasgow), and in the valleys of South Wales. By 1981, poverty levels had decreased almost everywhere, with high-level pockets remaining in inner London, Glasgow, and some cities of northern England. Areas with poverty levels below 10% are now much more prevalent than in 1971. This trend is reversed during the 1980s, with the map for 1991 resembling that for 1971, with even higher levels evident in places like Glasgow, the West Midlands,

and many northern cities. The trend of the 1980s continues through the 1990s, with the map for 2001 showing levels above 50% in a number of cities, and no areas remain with rates below 10%.

As figure 2 shows, the changing geography of core poverty over the 1971 – 2001 period is quite similar to that of breadline poverty up to 1991. Although the overall incidence of core poverty is considerably lower than that of breadline poverty, it is again primarily concentrated in (post)industrial areas and the major urban conurbations, including the industrial conurbations of south Lancashire, Liverpool, Manchester and West Yorkshire, in the South Wales valleys, in the West Midlands, and in the central belt of Scotland. However, after 1991, and unlike breadline poverty, core poverty levels decline in many areas, though less so in (post)industrial and metropolitan areas including Glasgow, the North, the West Midlands, and London. Moreover, although overall levels of core poverty declined somewhat over the 1970 (17.7%) to 1990 (14.1%) period, the geography of core poverty has changed strikingly, with the urban clustering of core poverty being much more pronounced in the later census periods, especially for inner-city areas.

The general concentration of poverty in urban and (post)industrial areas is corroborated by other studies examining the spatial distribution of poverty and other indicators of disadvantage (see eg Champion et al, 1987; Dorling and Thomas, 2004; Gordon and Forrest, 1995; Green, 1995; Philo, 1995; Robson et al, 1995). Whilst based upon different methods, datasets, time periods, and geographies, they collectively draw attention to the ways in which the distribution of poverty reflects *spatial* processes of economic marginalisation. Poverty rates are highest in areas experiencing deindustrialisation as a result of the decline of traditional extractive, primary, and manufacturing industries in the major cities and urban conurbations, including inner London, the South Wales valleys, the West Midlands, the North West, the West Riding, Tyneside, and Glasgow. Based upon consistent definitions, methods, and geographies, these data confirm the spatial segregation of these 'poor areas' and also suggest that, unlike the 1970s, processes of spatial polarisation in poverty became more pronounced during the 1980s and 1990s.

Poverty and spatial polarisation

Whilst changing headline rates and their social distribution are worthy objects of study in themselves, what these data tell us about the widening socioeconomic gap in living standards between areas is perhaps of greater policy significance. In order to assess the changing degree of polarisation, we replicate a method developed by Dorling and Woodward (1996). Here, we examine the poverty trajectories of census tracts by studying their movement over the 1971 – 2001 period between fourteen categories defined as proportions relative to two fixed and essentially arbitrary thresholds: breadline poverty (BP)—20%; and core poverty—10%. Table 4 describes the changing distribution of the population between census tracts for each decennial census interval, as well as across the 1971 – 2001 period as a whole. Positive values in the upper half of the table indicate an increase in the number of households living in relatively affluent tracts. Similarly, positive values in the lower half of the table indicate an increase in the number of households living in poorer tracts. For example, with regard to breadline poverty, table 4 shows that from 1971 to 1981, the proportion of the British population living in tracts where less than 10% of households were breadline poor increased by about 7%, and the proportion of households living in areas with breadline poverty rates in excess of 20% declined in all cases. Similarly, table 4 shows that during the 1991 – 2001 period, the proportion of the population living in tracts where between 15% and 20% of households were classified as experiencing core poverty declined by around 18%.

As table 4 illustrates, overall trends with regard to breadline poverty suggest that during the 1970s British households became much less concentrated in areas of high

Table 4. Change in the proportion of households living in population tracts by breadline poverty (BP) and core poverty (CP) rate, 1971 – 2001 (%).

Proportion of threshold value[a]	1970s		1980s		1990s		1971 – 2001	
	BP	CP	BP	CP	BP	CP	BP	CP
Less poor								
<0.5	7.6	2.5	−6.8	−2.6	−1.1	0.1	−0.2	0.0
0.50 – 0.67	18.9	16.3	−14.2	−16.2	−8.9	4.4	−4.2	4.4
0.67 – 0.71	5.1	6.6	−0.9	−6.1	−4.8	2.8	−0.5	3.4
0.71 – 0.77	4.1	6.3	−2.7	−6.6	−3.8	6.4	−2.3	6.2
0.77 – 0.83	1.3	5.5	1.6	−4.8	−4.4	3.4	−1.4	4.1
0.83 – 0.91	−0.9	4.7	−0.2	−2.1	−0.7	4.8	−1.7	7.3
0.91 – 1.0	−2.0	3.0	0.8	0.5	−1.6	1.2	−2.8	4.7
More poor								
1.0 – 1.1	−6.6	2.1	1.6	−1.0	−0.2	2.5	−5.3	3.6
1.1 – 1.2	−6.3	−2.4	3.4	1.0	−0.5	1.3	−3.4	−0.1
1.2 – 1.3	−5.1	−6.1	2.2	1.6	1.9	1.2	−1.0	−3.3
1.3 – 1.4	−5.9	−7.3	4.4	1.5	0.7	−1.0	−0.9	−6.8
1.4 – 1.5	−3.5	−8.9	1.5	5.4	5.0	−3.0	3.0	−6.6
1.5 – 2.0	−5.9	−16.1	7.7	17.9	10.2	−14.4	12.0	−12.6
>2.0	−0.9	−6.2	1.6	11.5	8.1	−9.6	8.9	−4.4

[a] Threshold values: for BP, value: 20%; for CP, value = 10%.

poverty, but that this process was reversed during the 1980s and 1990s with an increasing concentration of British households in 'poor places'. Over the 1971 – 2001 period as a whole, table 4 suggests an increasing concentration of households in areas with breadline poverty rates in excess of 30% (ie BP > 1.5): worse-off British households have become increasingly concentrated in enclaves of high breadline poverty. With respect to core poverty, a broadly similar trend is evident during the 1970s and 1980s with a declining concentration of households in areas of high poverty in the 1970s and an equally striking reversal of this trend towards greater social – spatial equality during the 1980s.

However, table 4 also shows that during the 1990s there are divergent trends with regard to the profile of breadline and core poverty. Whereas British households became more concentrated in poor areas with regard to breadline poverty (continuing a trend first observed in the 1980s for both measures), of core poverty there is a decline in the concentration of households in poor areas. This is also reflected in divergent trends across the period of observation as a whole for breadline and core poverty. Over the 1971 – 2001 period, British households have become more concentrated in areas of high breadline poverty (ie areas with breadline poverty scores in excess of 30%). At the same time, and although the magnitude of overall change is much smaller, households appear to be less concentrated in areas of high core poverty (ie areas with core poverty scores in excess of 15%).

Discussion

How then should we explain these apparently divergent trends in breadline and core poverty since 1991? Do these trends reflect real underlying changes in the incidence and distribution of poverty defined in various ways, or is this apparent divergence since 1991 merely artefactual? Analysis of the survey data upon which these models are based demonstrates a substantial overlap between breadline and core poverty classifications and, since the incidence of core poverty is much less prevalent at every time point than breadline poverty, it may be that core poverty taps 'extreme poverty' as opposed to the broader conceptualisation reflected in the breadline index. Certainly, this is the general interpretation accorded to core poverty by Whelan et al (2001) in their original

operationalisation of this concept. Indeed, analysis of chronic and persistent poverty using a comparable methodology is suggestive of such a decline (Gordon et al, 2000). It could be, therefore, that whilst poverty has become more widespread during the 1990s, extreme poverty may have simultaneously become less prevalent.

Alternatively, this divergence may reflect more basic differences in the definition and measurement of poverty. We have seen that core poverty measurement is based upon a set of deprivation indicators which are time invariant. Given rising levels of affluence across the period as a whole, we would therefore expect to find a corresponding general decline in core poverty and in general this conclusion is corroborated by these results. Thus, core poverty declined dramatically in the 1970s and again to a lesser extent in the 1990s. The exception here is the 1980s, when poverty levels rose so dramatically that even absolute indicators record an increase (though of a much smaller magnitude than is the case for breadline poverty). In contrast, the breadline index is based upon a relative concept in which poverty is understood as an enforced lack of socially perceived necessities—necessities which by definition are subject to change across time (see eg Gordon, 2007; Townsend, 1974; 1979; 1987). Whilst the breadline indices presented here are conceptually and methodologically consistent over time this does not therefore imply adoption of a common set of deprivation items. Indeed, since the public's perceptions of the 'necessities of life' change over time, this should be reflected in poverty measurement. On this basis, we argue here that breadline poverty represents the best available approach to the definition and measurement of poverty, the adequacy of which can be formally assessed on the basis of established criteria of validity, reliability and additivity—as discussed above. Research comparing different small-area deprivation indices has reached broadly similar conclusions (eg Lee et al, 1995). However, in times of great and adverse social upheaval such as the early 1980s (and again perhaps today), the core poverty indicator can show when absolute rates of poverty are rising and where such poverty is concentrated.

What then are the substantive conclusions to be drawn from these analyses in explaining the increasing spatial concentration of breadline poverty over the 1971–2001 period? In terms of the overall concentration of breadline poverty, it may that poorer populations have grown fastest in poor areas, replacing households not classified as breadline poor who have dissolved, left, or died. Alternatively, it could be that more affluent people have been moving out of poor areas and into more wealthy places, though clearly in both respects the underlying mechanisms are likely to vary from place to place. Certainly, earlier analysis of population trends across tracts since 1971 suggests that the poorest decile of census tracts in 1971 (according to the breadline poverty indicator) experienced a substantial decline in population—losing approximately one fifth of their population by 2001—with a corresponding growth in population in the most affluent (ie least poor) decile of census tracts over the same period. Much of the decline in the population of the poorest tracts in 1971 occurred during the 1970s, and to a lesser extent in the 1980s, perhaps suggesting a process of out-migration associated with the decline of traditional extractive and manufacturing industries (as well as higher mortality rates and reduced in-migration in these areas). Nevertheless, earlier analyses suggest that during the 1990s these areas have in fact experienced a modest population increase. This may reflect changes in the impacts of economic 'restructuring' arising from the 1990/91 recession which particularly affected the types of service sector employment more prevalent in relatively affluent areas concentrated in the southeast of England. At the same time, this may also partly reflect the demographic structure of poor areas, which tend to have younger populations such that losses due to deaths and out-migration may also be outweighed by birth and in-migration gains (see Dorling et al, 2007, pages 39–40, for further details).

Conclusions

In recent years an increasing interest in the spatial distribution of poverty has been facilitated by methodological developments associated with the applications of GIS approaches, better availability of suitable spatially referenced data at a small area level, and the growing prominence of area-based initiatives in tackling poverty in Britain and elsewhere. For the first time, it is possible to estimate the spatial distribution of poverty across time on the basis of consistent methods and indicators. That is what this paper demonstrates. Based upon such an approach, we conclude that the overall incidence of poverty at the household level has increased substantially over the 1971 – 2001 period in Britain, and that poverty has also become increasingly spatially concentrated during this period. The former finding is very much corroborated by existing research into national trends in the distribution of income inequality and poverty at the household level (eg Brewer et al, 2006; Gordon, 2000; Sefton and Sutherland, 2005). Regrettably, much less work exists on the spatial consequences of these trends with regard to the geographical distribution of poverty and inequality in Britain, though existing research in this area is consistent with these findings (eg Dorling and Rees, 2003; see also Gibbons et al, 2005; Noble and Smith, 1996).

However, before considering the policy implications of these findings it is important also to acknowledge the limitations of this approach, and therefore the potential for further work in this area. Firstly, whilst it is clearly vital to describe accurately the changing spatial distribution as detailed above, it is equally important to explain such trends if we are to develop effective policies directed at eradicating poverty. In the absence of suitable panel data at the household level it is not possible to explain trends in the spatial distribution of poverty over this period definitively. One further extension of this approach may therefore be to take advantage of Census Longitudinal Study data in order to examine patterns of migration at the individual level. At the same time, the importance of local case studies and qualitative research should not be underestimated. Secondly, the modelling approach adopted here assumes that the relationship between poverty and the social – demographic predictors included here does not itself vary across space. For example, lack of access to a car is assumed to have the same relationship to poverty in inner London as in rural Wales. This assumption of spatial homogeneity is unlikely to be correct, and where suitable spatially referenced data are available more advanced approaches such as geographically weighted regression (eg Fotheringham et al, 2002), might be fruitfully applied to investigate and map local variations from the global models presented here.

Thirdly, it will also be instructive in future work not only to examine general trends in the spatial distribution of poverty but also to investigate in much greater detail, and on the basis of local knowledge and studies, spatial outliers within these data, that is, areas which have experienced atypical changes in poverty rates in comparison with 'global' trends across Britain as a whole. For example, what specific local factors and contingencies may help to explain the poverty trajectory of places which have managed to 'buck the trend' by recording lower than expected increases in poverty over time? Related to this point, the significance of place itself in shaping poverty trajectories (as opposed to generic area classifications) is a topic meriting much closer attention both within the research community, and in the development of local and national strategies for reducing inequalities.

What then are the implications of these findings for policies directed at tackling poverty and disadvantage? It is clear from these findings that increasing impoverishment of substantial sections of the British population is a process operating not only at an individual and household level, but is one associated with substantial changes in the prospects of places. It would be tempting to suggest, therefore, that a renewed

emphasis upon area-based solutions to poverty is called for. However, the limitations of area-based approaches in tackling poverty have been well documented since Townsend's (1979) trenchant critique of this approach. In particular, despite the increasing spatial concentration of poverty over this period, the majority of poor households do not live in areas experiencing high concentrations of poverty. Equally, within these areas (and depending on the scale of analysis) it generally remains the case that a majority of household are not classified as poor. Moreover, the rationales offered for area-based measures frequently conflate compositional effects (associated with a concentration of poor households) with genuine neighbourhood effects (associated with the specific penalties attached to place) (Powell et al, 2001; see also Fieldhouse and Tye, 1996). Whilst targeted area-based interventions certainly have a role to play in tackling poverty (see eg Smith, 1999), the reform of mainstream policies and provision targeted at individuals and households is likely to be both a more effective and a more efficient strategy. Above all, the enduring nature of these trends suggests that radical policy solutions focused upon a sustained commitment to the redistribution of wealth (encompassing not only those at the bottom of society but also those at the top) will be necessary to reverse these trends (Dorling, 2010).

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Appendix

Table A1. the 'necessities of life' and household deprivation in Britain, 1968 – 99.

	Necessities of life			Lack item			
	1983	1990	1999	1968/69[a]	1983	1990	1999
Meat/fish (or vegetarian equivalent) every other day	63	77	79	25	9	4	3
A roast meat joint or its equivalent	67	64	56	26	10	7	3
Two pairs of all-weather shoes	78	74	64	3	10	5	5
A warm waterproof coat	87	91	85	33	8	4	4
Best outfit for special occasions	–	54	51	–	–	8	4
Appropriate clothes for job interviews	–	–	69	–	–	–	4
A decent state of decoration in the home	–	92	82	–	–	16	14
Two meals a day for adults	–	90	91	–	–	2	1
Medicines prescribed by doctor	–	–	90	–	–	–	1
Electricity for both power and light	–	–	–	2	–	–	–
Replace or repair broken electrical goods	–	–	85	–	–	–	12
Replace worn-out furniture	–	–	54	–	–	–	12
Heating to warm living areas of the home	97	97	94	5	7	3	1
Insurance of dwelling contents	–	88	79	–	–	11	8
Daily fresh fruit and vegetables	–	88	86	–	–	7	4
Fridge	77	92	89	45	[3]	1	<1
Radio	–	–	–	8	–	–	–
Dictionary	–	–	53	–	–	–	5
Telephone	43	56	71	[69]	–	7	1
Toys for children	71	84	84	–	–	1	<1
Leisure equipment for children	57	61	62	–	–	2	3
Bedroom for every child over 10 of different sex	77	82	80	–	[?]	2	3
Child's participation in out-of-school activities	–	69	–	–	–	3	2
Weekly outing for children	40	53	–	–	–	4	–
Children's friends round for tea once a week	37	52	59	15	–	2	4
Visits to school, eg sports day	–	–	81	–	–	–	2
Collect children from school	–	–	75	–	–	–	2
Regular savings for a 'rainy day'	–	68	66	–	–	32	25
Washing machine	67	73	77	41	[7]	4	2
Vacuum cleaner	–	–	–	22	–	–	–
Carpets in living areas	70	78	67	8	4	2	3
Chairs for all plus guest	–	–	–	5	–	–	–
Home free of structural defects	–	–	–	22	–	–	–
Home free of structural defects dangerous to health	–	–	–	7	–	–	–
Celebrations on special occasions such as Xmas	60	74	83	18	5	4	2
Attending family events (weddings, funerals)	–	–	80	–	–	–	3
Visiting friends or family in hospital	–	–	92	–	–	–	3
Visits to friends or family	–	–	84	–	–	–	2
At least one evening/afternoon out in last two weeks	[36]	[42]	41	29	[19]	22	17
Had friend for dinner/snack at home in last four weeks	[32]	[37]	64	36	[13]	11	6
New, not second-hand, clothes	64	65	50	–	7	5	6
Damp-free home	96	98	93	–	10	2	6
A hobby or leisure activity	64	67	78	–	7	8	7
A small amount of personal spending money	–	–	59	–	–	–	13
A week's annual holiday away from home	63	54	55	–	24	22	18
Presents for family once a year	63	69	56	–	7	6	3

Note. [ ] Item included for comparison only but excluded from deprivation index; – data unavailable.
[a] 1968/69 data include Northern Ireland.

Table A2. Public acceptability, validity, reliability, and additivity: deleted deprivation items, 1968 – 99.

	1968/69	1983	1990	1999
Television	validity	reliability	validity	reliability
Annual holiday away from home	acceptability	*	acceptability	acceptability
Beds for everyone in the household	–	reliability	validity	reliability
Dressing gown	–	acceptability	acceptability	acceptability
Night out once a fortnight	–	acceptability	acceptability	acceptability
Bath (not shared)	–	validity	validity	reliability
Car	–	acceptability	acceptability	acceptability
CD/record player	acceptability	–	–	acceptability
Dishwasher	–	–	acceptability	acceptability
Fares to visit friends 4 times a year	–	–	acceptability	acceptability
Freezer/fridge-freezer	–	reliability	–	additivity
Friends/family round for a meal monthly	–	acceptability	acceptability	*
Garden large enough to sit in	validity	validity	validity	–
Home computer	–	–	acceptability	acceptability
Indoor toilet (not shared)	–	validity	validity	–
New, not second-hand, clothes	additivity	*	*	acceptability
Packet of cigarettes every other day	–	acceptability	acceptability	–
Refrigerator	–	reliability	*	reliability
Restaurant meal monthly	–	–	acceptability	acceptability
Telephone	acceptability	acceptability	*	*
Video	–	–	acceptability	acceptability
Washing machine	–	reliability	*	reliability
Air not dirty, smoky, or foul-smelling	reliability	–	–	–
Attending place of worship	–	–	–	acceptability
Best outfit for special occasions	–	acceptability	*	*
Cooked breakfast most days	acceptability	–	–	–
Cooked meal every day in last fortnight	additivity	–	–	–
Daily newspaper	–	–	–	acceptability
Electricity for both power and light	validity	–	–	–
Heating to keep living areas warm	acceptability	*	*	*
Medicines prescribed by GP	–	–	–	additivity
Microwave oven	–	–	–	acceptability
Public transport for one's needs	–	validity	–	–
Self-contained accommodation	–	reliability	–	–
Three pints of milk per person per week	additivity	–	–	–
Tumble dryer	–	–	–	acceptability
Visiting pub once a fortnight	–	–	–	acceptability

* Item included in final deprivation index; – item not included in dataset.

Table A3. Selected breadline deprivation index items, 1968 – 99.

	1968/69	1983	1990	1999
Meat/fish (or vegetarian equivalent) every other day	●	●	●	●
A roast meat joint or its equivalent	●	●	●	●
Two pairs of all-weather shoes	●	●	●	●
A warm waterproof coat	●	●	●	●
Best outfit for special occasions			●	●
Appropriate clothes for job interviews				●
A decent state of decoration in the home			●	●
Two meals a day for adults			●	●
Medicines prescribed by doctor				●
Electricity for both power and light	●			
Replace or repair broken electrical goods				●
Replace worn-out furniture				●
Heating to warm living areas of the home	●	●	●	●
Insurance of dwelling contents			●	●
Daily fresh fruit and vegetables			●	●
Fridge	●	○	●	●
Radio	●	○	●	●
Dictionary				●
Telephone	○		●	●
Toys for children			●	●
Leisure equipment for children			●	●
Bedroom for every child over 10 of different sexes		○	●	●
Child's participation in out-of-school activities			●	●
Weekly outing for children			●	
Children's friends round for tea once a week	●		●	●
Visits to school, eg sports day				●
Collect children from school				●
Regular savings for a 'rainy day'			●	●
Washing machine	●	○	●	●
Vacuum cleaner	●			
Carpets in living areas	●	●	●	●
Chairs for all plus guest	●			
Home free of structural defects	●			
Home free of structural defects dangerous to health	●			
Celebrations on special occasions such as Xmas	●	●	●	●
Attending family events (weddings, funerals)				●
Visiting friends or family in hospital				●
Visits to friends or family				●
At least one evening/afternoon out in last two weeks	●	○	●	●
Had friend for dinner/snack at home in last four weeks	●	○	●	●
New, not second-hand, clothes		●	●	●
Damp-free home		●	●	●
A hobby or leisure activity		●	●	●
A small amount of personal spending money				●
A week's annual holiday away from home		●	●	●
Presents for family once a year		●	●	●

Note. ● Item included in final index; ○ item available but not included in final index.

Table A4. Identification of optimal breadline deprivation thresholds—ANOVA and logistic regression model statistics 1968 – 99 (selected breadline deprivation thresholds are shown in bold face).

	1968/69		1983		1990		1999	
	F	χ^2	*F*	χ^2	*F*	χ^2	*F*	χ^2
1+ item	27.5	24.2	66.8	112.3	20.6	228.6	51.9	185.3
2+ items	113.6	94.0	48.5	98.2	26.7	255.8	**70.3**	**241.3**
3+ items	155.0	129.7	**41.2**	**94.9**	**29.6**	**217.2**	60.3	234.5
4+ items	160.5	149.1	40.1	87.6	15.9	172.9	56.3	221.2
5+ items	**197.6**	**191.2**	24.4	67.7	16.2	150.4	47.7	197.2
6+ items	162.2	157.1	16.7	59.8	9.3	136.1	36.3	150.0
7+ items	126.4	76.1	–	–	–	–	–	–
N (items)	17		13		27		29	
Scale alpha	0.723		0.837		0.863		0.883	

Note. Logistic regression model (χ^2): dependent—deprivation threshold; predictors—Poverty and Social Exclusion Survey income, adults (*N*), children (*N*). ANOVA model (*F* ratio): dependent—PSE income; predictors—deprivation threshold, adults (*N*), children (*N*). – not computed.

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